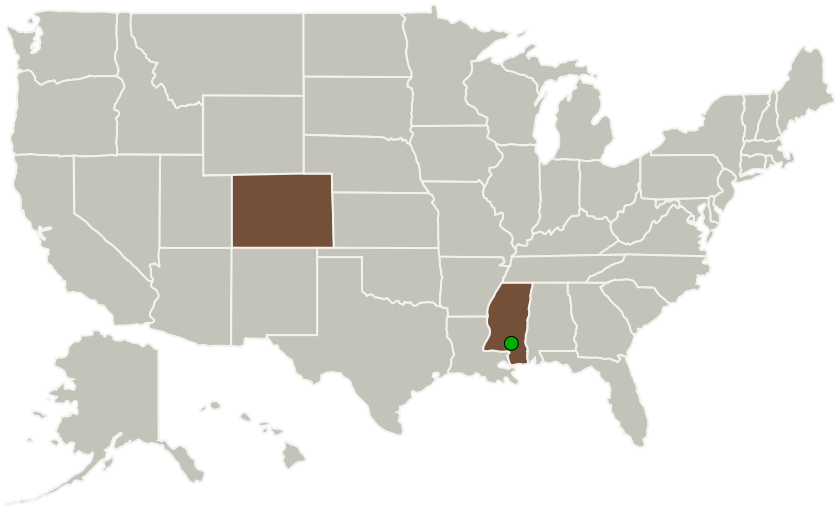
Novel Sorbent to Remove Radioactive Halogens and Noble Gases from NTP Engine Exhaust, Phase I

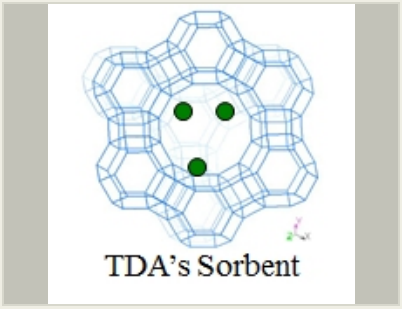
Completed Technology Project (2017 - 2017)

Project Introduction

Solid core Nuclear Thermal Propulsion (NTP) has been identified as the advanced propulsion concept which could provide the fastest trip times with fewer Space Launch System (SLS) launches for human missions to Mars. However, current environmental regulations require NTP engine exhaust filtering of radioactive halogens, noble gases and particulates to stay within safe limits. Particularly high efficiency (greater than 99.5%) removal of radioactive halogens, noble gases and vapor phase contaminants is of specific interest to NASA. In this SBIR project, TDA Research, Inc. proposes to develop a novel high capacity sorbent to remove radioactive halogens and noble gases from NTP engine exhaust with an efficiency greater than 99.5%. This sorbent will be part of an effluent scrubber system, which initially cools the hot hydrogen exhaust with a water spray, and then further cools it and removes the water in a series of heat exchangers. In Phase I, we will prepare the sorbent and demonstrate its ability to selectively remove radioactive halogens and noble gases under simulated NTP engine exhaust conditions. Based on the performance results, we will carry out a preliminary design of the scrubbing system for NTP engine exhaust and estimate its size and cost.

Primary U.S. Work Locations and Key Partners





Novel Sorbent to Remove Radioactive Halogens and Noble Gases from NTP Engine Exhaust, Phase I Briefing Chart Image

Table of Contents

Novel Sorbent to Remove Radioactive Halogens and Noble Gases from NTP Engine Exhaust, Phase I

Completed Technology Project (2017 - 2017)

Organizations Performing Work	Role	Type	Location
TDA Research, Inc.	Lead Organization	Industry	Wheat Ridge, Colorado
Stennis Space Center(SSC)	Supporting Organization	NASA Center	Stennis Space Center, Mississippi

Primary U.S. Work Locations	
Colorado	Mississippi

Images

Briefing Chart Image
Novel Sorbent to Remove Radioactive Halogens and Noble Gases from NTP Engine Exhaust, Phase I Briefing Chart Image *(https://techport.nasa.gov/image/126685)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
TDA Research, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

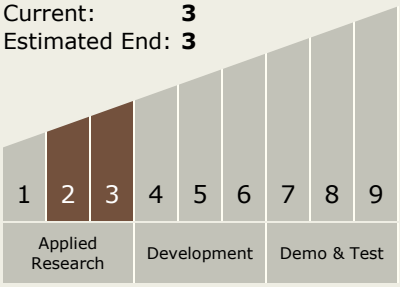
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Ambalavanan Jayaraman

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



Novel Sorbent to Remove Radioactive Halogens and Noble Gases from NTP Engine Exhaust, Phase I

Completed Technology Project (2017 - 2017)

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.4 Advanced Propulsion
    - TX01.4.3 Nuclear Thermal Propulsion